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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Norbert MÜLLER

Title: AIR-CONDITIONED SWITCHING CABINET

Based Upon: PCT/EP96/05789

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TRANSMITTAL OF SUBSTITUTE SPECIFICATION

Box PCT

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Applicant has enclosed a Substitute Specification attached to a blue ink marked-up copy of the verified English language translation of PCT International Application PCT/EP96/05789. The blue ink identifies changes to the verified English language translation which are incorporated in the Substitute Specification.

The Substitute Specification includes general revisions to correct idiomatic translational errors and to provide proper headings. The undersigned states that the Substitute Specification contains no new matter.

Based Upon: PCT/EP96/05789

Applicant sincerely believes that this patent application is now in condition for prosecution before the U.S. Patent and Trademark Office.

Respectfully submitted,



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SUBSTITUTE SPECIFICATION

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AIR-CONDITIONED SWITCHING CABINET

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to an air-conditioned switchgear cabinet with wall elements and at least one cabinet door, as well as an air-conditioner and/or heat exchanger.

Description of Prior Art

In known air-conditioned switchgear cabinets, the air-conditioner is a component separate from the switchgear cabinet, which must be placed on the switchgear cabinet and brought into air-conducting connection with the interior of the switchgear cabinet. In this case the cover of the switchgear cabinet must have openings, which are matched to the air-aspirating and air-outlet openings of the air-conditioner, such as represented, for example, in German Patent References DE 37 10 566 and DE 37 35 551 C1. Such a design of a switchgear cabinet is particularly suited for retrofitting the switchgear cabinet with an air-conditioner, but requires increased costs for parts for the air-conditioner designed as a separate unit.

Switchgear cabinets, or respectively walls of switchgear cabinets are also known, wherein an air-conditioner, or components thereof, is installed in the interior of the cabinet body or rack of the switchgear cabinet, as shown in German Patent Reference DE 88 07 768 U1. However, equipping an air-conditioned switchgear cabinet in this way has one disadvantage that space for assemblies in the

interior is lost and that air-conditioning a fully equipped switchgear cabinet at a later time is no longer possible.

As shown in German Patent References DE 37 38 941 C1 and DE 40 13 372 A1, it is known to install an air-conditioner in an open side of a rack. This has the advantage that the interior can be practically completely available for assemblies and that in certain installation situations of the cooling device a later installation on a completely equipped switchgear cabinet is also possible. However, defined additional fastening elements must be provided for this.

SUMMARY OF THE INVENTION

It is one object of this invention to provide an air-conditioned switchgear cabinet of the type mentioned above which is considerably simpler in design and can be delivered, without hampering the installation of assemblies in the interior, with or without an air-conditioner and/or heat exchanger, but also permits a later installation.

In accordance with this invention, this object is attained with an air-conditioner and/or a heat exchanger that is integrated in a wall element or the cabinet door, wherein the wall element or the cabinet door are embodied as a housing for receiving the components of the air-conditioner and/or the heat exchanger.

With this design, the switchgear cabinet and the air-conditioner and/or the heat exchanger are normally one unit, which leaves the interior completely free for installations by the user. But the wall element or the cabinet door with the air-

conditioner and/or the heat exchanger constitute a further structural unit which can be cost-effectively produced and which can be retrofitted at any time as the replacement for a wall element or the cabinet door of a non-air-conditioned switchgear cabinet. It is thus possible to provide a fully equipped switchgear cabinet with a capability to add an air-conditioner and/or heat exchanger at a later time.

If in one embodiment the wall element or the cabinet door border a receptacle space which adjoins the interior of the rack or the cabinet body, the interior is outwardly expanded in the simplest way and the wall element of the cabinet door retains the original function as a closure of the switchgear cabinet, but constitutes the housing for receiving the components of the air-conditioner and/or the heat exchanger.

In a further embodiment the components of the air-conditioner and/or the heat exchanger are connected and wired with each other, ready for operation. It is then merely required to connect the air-conditioner and/or the heat exchanger with the electric power supply for the switchgear cabinet.

Air circulation in the switchgear cabinet can be directly affected in that the components of the air-conditioner and/or the heat exchanger are covered toward the interior of the cabinet body of the rack by means of a cover and that, with the integration of an air-conditioner, the cover has air-aspirating and air-outlet openings, or that, with the integration of a heat exchanger, the cover has air-inlet openings and the wall element or the cabinet door with air-outlet openings.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention will be explained in more detail by means of exemplary embodiments schematically represented in the drawings wherein:

Fig. 1 is a schematic perspective representation of an opened switchgear cabinet with a rack, wherein an air-conditioner is integrated in a wall element; and

Fig. 2 is a schematic perspective representation of an opened switchgear cabinet with a cabinet body, wherein an air-conditioner is integrated in the cabinet door.

DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 1 shows a switchgear cabinet with a rack 10, which is closed on three sides by means of a bottom sheet metal plate 17, a cover sheet metal plate 18 and a wall element 19.

The left side of the rack 10, which is delimited by vertical frame legs 11 and 12 and horizontal frame legs 16, is closed with a wall element 20, in which an air-conditioner with the components 23, 24 and 25 is integrated. The front of the rack 10, delimited by the frame legs 11, 13, 14 and 15 is closed by means of a cabinet door 30. The cabinet door 30 is hinged to the vertical frame leg 13 by means of hinges 32 and can be fixed in the closed position by means of a lock 31. The cabinet door 30 can be reinforced on the inside by means of a door frame 33 placed on the cabinet door 30.

The wall element 20, which is trapezoidal in cross section, with inclined wall elements 21 and 22, forms a tub-like housing, in which the components 23, 24 and 25 of the air-conditioner and/or the heat exchanger are installed, so that an integrated component is created which can be connected with the rack 10 like a normal wall element 19.

The components 23, 24 and 25 can be covered in the wall element 20 by means of a cover, which has air-aspirating and air-outlet openings. In this case the appropriately designed components of the air-conditioner can follow directly behind the air-conditioner. When integrating a heat exchanger, the cover can have inlet openings and the wall element 20 can have air-outlet openings. The arrangement of the air-inlet openings and air-outlet openings and the distribution of the components 23, 24 and 25 dictate the circulation of air in the heat exchanger, in a known manner.

In place of the rack 10 and the wall elements, it is also possible to use a cabinet body 10', which is only open at a front, as shown in Fig. 2. Then the cabinet door 30 is designed as the housing for the components 23, 24 and 25 of the air-conditioner and/or the heat exchanger. The cabinet door 30 with the integrated air-conditioner and/or heat exchanger is hinged on the cabinet body like a normal cabinet door. As a rule, the air-conditioned switchgear cabinet with the air-conditioner and/or heat exchanger integrated in the cabinet door 30 is available as a delivered unit and can be purchased with components which are connected and wired ready for operation. The cabinet door 30 with the integrated air-conditioner and/or heat

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exchanger can also be ordered later as a component and can be used later for air-conditioning a completely built and equipped switchgear cabinet. In this case only the cabinet door 30 needs to be exchanged.

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